

PATENT SPECIFICATION

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(54) A METHOD OF AND APPARATUS FOR CLEAVING BUILDING SLABS

(71) I, HANS JUUL, of Elletofte 24, 2800 Lyngby, Denmark, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of cleaving building slabs, especially bricks, to form rough split faces thereon, using opposed parallel knives which are moved towards each other to engage the slab to be cleaved.

It is known to effect such cleaving using a single pair of knives mounted in a press. If the cleaving is effected in the mid portion of the slab the cleft faces are usually almost planar, but of course they are rough. However, sometimes a cleft face is desired which deviates from a nearly planar shape and which is of a convex nature. If the cleaving is effected near an end or to a side face of the slab, there will be a tendency to form a face with such a convex nature; however often an oblique cleft face is created.

An object of the invention is to provide a method of cleaving slabs as aforesaid, but having the considerably advantage that it enables reliable production of cleft faces of a convex nature, and permits the production of slab sections having faces of desired profiles.

With this object in view, the present invention provides a method of cleaving a building slab, such as a brick, to obtain rough cleft surfaces using opposed parallel knives moved towards each other for engagement with the slab to cleave the latter, characterized in that the stone is held fast during the cleaving and in that the cleaving is performed by two opposed pairs of knives lying in parallel planes spaced apart by a distance not exceeding 50% of the thickness of the slab.

Desired convex cleft faces could only be obtained by prior known cleaving methods

near the side faces or end faces. This is probably due to the fact that the rather thin cut-off portions are able to react against the transverse forces created during the cleaving only to a small degree, so that a main transverse force originating from the main mass of the stone is created, and this is combined with the vertical main forces from the knife, so that the total cleaving forces, determining the course of the cleft face, create an outwardly curved course.

If attempt is made to cleave the slab at a somewhat greater distance from the edges, using the known methods, the portions lying outside the knife will be able to impart an essentially transverse force during the cleaving, which force will mainly compensate the transverse forces from within the slab, so that the curved course of the cleaving forces and the resulting convex cleft face are no longer obtained.

By using two pairs of knives in the method of the invention it is possible to obtain desired convex cleft faces, if required, at locations other than near to the side faces of the slab. During the cleaving, the two pairs of knives will force away from each other the two portions of the slab which lie outside the knife pairs, and from these portions will arise transverse forces directed towards the region between the knife pairs, the resultant cleaving forces following a course having a curvature towards this area and the cleft faces having corresponding convex portions.

Use is preferably made of knives each having sections with protruding edges alternating with sections with recessed edges. This permits the obtention of local bulges, instead of convex faces, extending through the whole length of the slab.

In each pair, the knives may be arranged so as to be offset so that each section with a protruding edge on one knife lies opposite a respective section with a recessed edge on the other knife, the two knives at the same side of the slab being offset, so that each

section with a protruding edge on one knife lies opposite a respective section with a recessed edge on the other knife. This method is especially effective for obtaining

5 local bulges or convex curvature.

More than two pairs of the knives may be used. In this way, it is possible to obtain convex cleft faces at several cuts simultaneously in a single slab.

10 The two pairs of knives may be brought together to engage the slab near an end or side face of the slab. This enables slab portions to be cut off at both ends and permits the obtention of convex (i.e. out-

15 wardly curved) cleft faces not only on the main slab, but also on the cutoff slab portions which can be used for instance as a wall covering material when a rustic look is desired.

20 The invention also provides apparatus for cleaving a building slab comprising two clamp assemblies for holding the slab to be cleft, means for holding two opposed pairs of knives lying in parallel planes and spaced

25 apart by a distance not exceeding 50% of the thickness of the slab and for moving the knives of the pairs towards one another for cleaving a slab held by the clamp assemblies, the clamp assemblies being able to yield

30 from an initial position, in which the edges of the knives are retracted relative to the clamp assemblies, to an engagement position in which the edges of the knives project relative to the clamp assemblies.

35 The clamp assemblies at one side of the slab may be yieldable only to a very restricted degree, to a cleaving position, whereas at the other side of the slab they are able to yield resiliently a longer distance for

40 protecting the press.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:—

45 Fig. 1 is a fragmentary elevation of a preferred form of the apparatus for cleaving slabs in accordance with the invention;

Fig. 2 is a part sectional perspective view, to a larger scale, of a set of knives for the tool shown in Fig. 1;

50 Fig. 3 is an elevation showing the cleaving of a slab according to a previously-known method;

55 Figs. 4 and 5 shows the cleaving of two different slabs, using the method of the invention; and

Fig. 6 shows the cleaving of another slab using the method of the invention.

60 The apparatus shown in Fig. 1, designed for mounting in a press, comprises two opposed pairs of knives 5, 6 and 7, 8 and two clamping assemblies 20, 21 and 22, 23. In the open position of the press, the two lower assembly parts 21, 23 project relative to the lower knives 6, 8 and the upper assembly

65 parts 20, 22 project downwards relative to

the upper knives 5, 7. A slab to be cleft is placed on the lower assembly parts 21, 23 with the area to be cleft disposed above the knives 6, 8. The clamp assemblies 21, 23 are able to yield to some extent, so that they descend somewhat during the cleaving, the knives 6, 8 coming into engagement with the slab. The upper clamp assemblies 20, 22 are mounted resiliently, being able to move upwards relative to the upper knives 5, 7 during the cleaving and allow these knives to engage the stone, holding the slab with a predetermined force and being able to compensate for slabs with varying thickness thereby to eliminate risk of damage to the press.

It is well known that there is a tendency for convex cleft faces to be formed when the cleaving is effected near the side face as shown in Fig. 3, where a slab 1 is cleft by a pair of knives 3, 4. The reason is, as explained above, that transverse cleaving forces are created during the cleaving, which forces do not encounter essential outward resistance from the thin stone layer but are compensated inwardly by reaction forces from the main mass of the stone, combined with the vertical cleaving forces from the knives 3 and 4 so as to build up outwardly-curved cleaving forces which the cleft face will follow when breaking off the outer thin stone layer as chips 2.

Such a convex cleft face will, however, only be formed if the knives 3, 4 engage the slab near one of its side or end faces. If the knives engage the slab farther away from the side, the outer stone layer will, with the increasing thickness of the layer, be better able to absorb the transverse forces and yield reaction forces compensating the reaction forces from the main mass of the slab, the course of the forces and the cleaving face becoming substantially planar.

If, however, the slab is engaged not by one opposed pair of knives 3, 4 but by two opposed pairs 5, 6 and 7, 8 as in the case of the apparatus shown in Fig. 1, convex cleaving faces can be obtained also when cleaving at the inner or middle portion of the slab, if the knives engage the slab sufficiently near each other as shown in Fig. 4. In the case of a slab with a thickness of 65 mm, the distance between the knives may preferably be 15 mm. Under these circumstances a thin layer will be formed between the two pairs of knives, such layer being unable to produce reaction forces which can compensate the reaction forces from the two slab layers outside the knives, when these have an essential thickness as shown in Fig. 4. Two cleft faces curving towards each other will be formed when breaking the intermediate slab layer, as shown in the drawing.

By the method illustrated in Fig. 4 a slab is

cleaved into two halves 1 and 1', both to be used for the building of a wall. If the cleaving is performed near a side or end face a slab is obtained, as shown in Fig. 5, with essentially full length or width and a thin offset 1' which can be used as a wall cladding material.

Often it is not desired to have bulges extending uniformly along the whole extent of the stone, but a more varying surface with local bulges. For this purpose, the knives shown in Fig. 2 are very effective. These knives 5, 6, 7, 8 have sections 9 to 13 with protruding edges alternating with sections 14 to 19 with recessed edges, each section 9 with a protruding edge on knife 5 lying horizontally and vertically opposite sections 15 and 17 with recessed edges on the adjacent knives 7 and 8, and sections with recessed edges opposite sections with protruding edges.

In cases where the desired bulges are difficult to obtain by the methods illustrated in Figs. 4 and 5, the difficulties can often be overcome if the slab at first is engaged by two diagonally opposed knives 9 and 12, as shown in Fig. 6, and then by two other diagonally-opposed knives 15 and 17. When the knives 9 and 12 engage a cleft face extending between points 9 and 12 will be formed, and when the two other knives 15 and 17 thereafter engage, the corners of the slab parts 1 and 1' will be broken down to the firstly formed cleft face. Due to the more or less irregular and curved course of the cleft faces, the desired bulges on the two slab parts 1 and 1' may be obtained.

It will be evident that the form and combination of the knives can be adapted, as may be required, for special purposes. The degree of bulge and their course can be adjusted by altering the angles of the edges of the knives. By engaging a slab with two sets of pairs of knives simultaneously on both sides, a section with convex surface can be cut away to form a slab with two opposite convex surfaces. It is also possible to engage a slab with a number of sets of pairs of knives alternating with a number of known sets of knives, and thereby divide the slab into a number of sections each with one convex surface and one opposite, essentially plane surface.

WHAT I CLAIM IS:—

1. A method of cleaving a building slab, such as a brick, to obtain rough cleft surfaces using opposed parallel knives moved towards each other for engagement with the

slab to cleave the latter, characterized in that the stone is held fast during the cleaving, and in that the cleaving is performed by two opposed pairs of knives lying in parallel planes spaced apart by a distance not exceeding 50% of the thickness of the slab.

2. A method as claimed in claim 1, characterized in that the knives each comprising sections with protruding edges alternating with sections with recessed edges.

3. A method as claimed in claim 2, characterized in that, in each pair, the knives are arranged so as to be offset, so that each section with protruding edge on one knife lies opposite a respective section with recessed edge on the other knife, and in that the two knives at the same side of the slab are offset so that each section with protruding edge on the one knife lies opposite a respective section with recessed edge on the other knife.

4. A method as claimed in claim 1, 2 or 3, characterized in that said two pairs of knives are brought together to engage the slab near an end or side face thereof.

5. Apparatus for use in cleaving a building slab, comprising two clamp assemblies for holding the slab to be cleft, means for holding two opposed pairs of knives lying in parallel planes and spaced apart by a distance not exceeding 50% of the thickness of the slab and for moving the knives of the pairs towards one another for cleaving a slab held by the clamp assemblies, the clamp assemblies being able to yield from an initial position, in which the edges of the knives are retracted relative to the clamp assemblies, to an engagement position in which the edges of the knives project relative to the clamp assemblies.

6. Apparatus as claimed in claim 5, characterized in that the clamp assemblies at one side of the slab are yieldable only to a very restricted degree, to a cleaving position, whereas at the other side of the slab, they are resiliently yieldable to a greater degree for the protection of the press.

7. A method of cleaving a building slab substantially as hereinbefore described with reference to and as illustrated in Figs. 1, 2, 4, 5 and 6 of the accompanying drawings.

8. Apparatus for cleaving a building slab substantially as hereinbefore described with reference to and as illustrated in Figs. 1, 2, 4, 5 and 6 of the accompanying drawings.

For the Applicant,
BARLOW, GILLET & PERCIVAL,
Chartered Patent Agents,
94, Market Street,
Manchester, 1.
—and—
20, Tooks Court,
Cursitor Street,
London, E.C.4.

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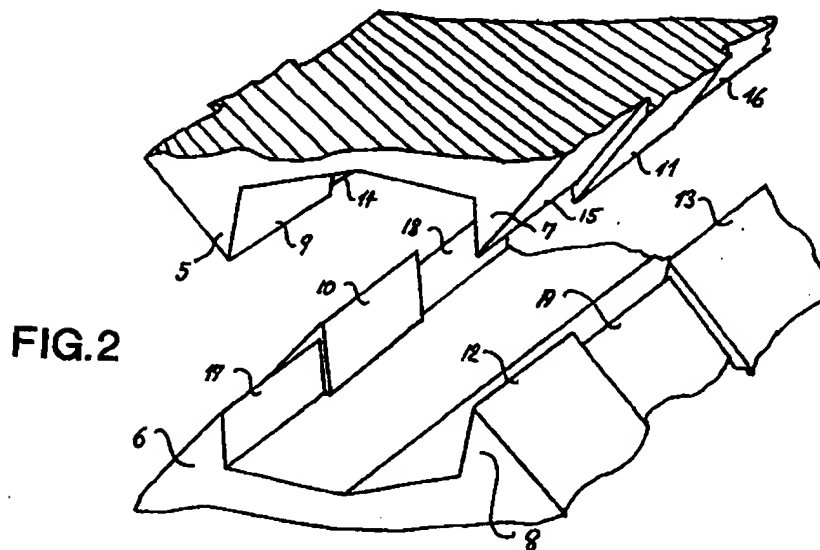
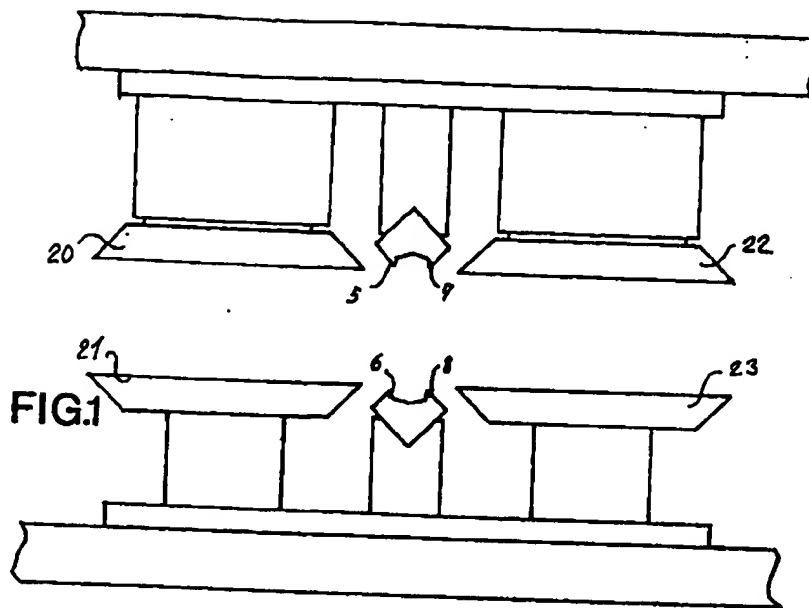


FIG.3

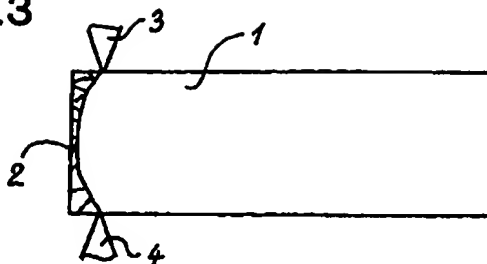


FIG.4

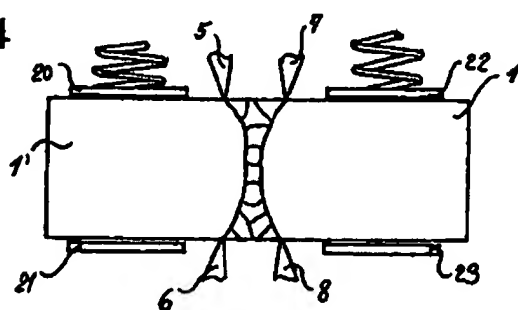


FIG.5

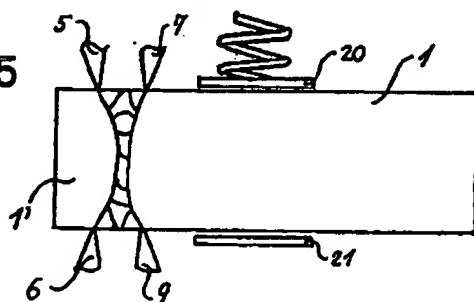


FIG.6

